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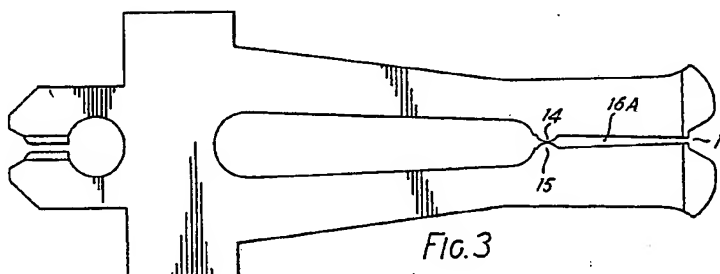
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H2E

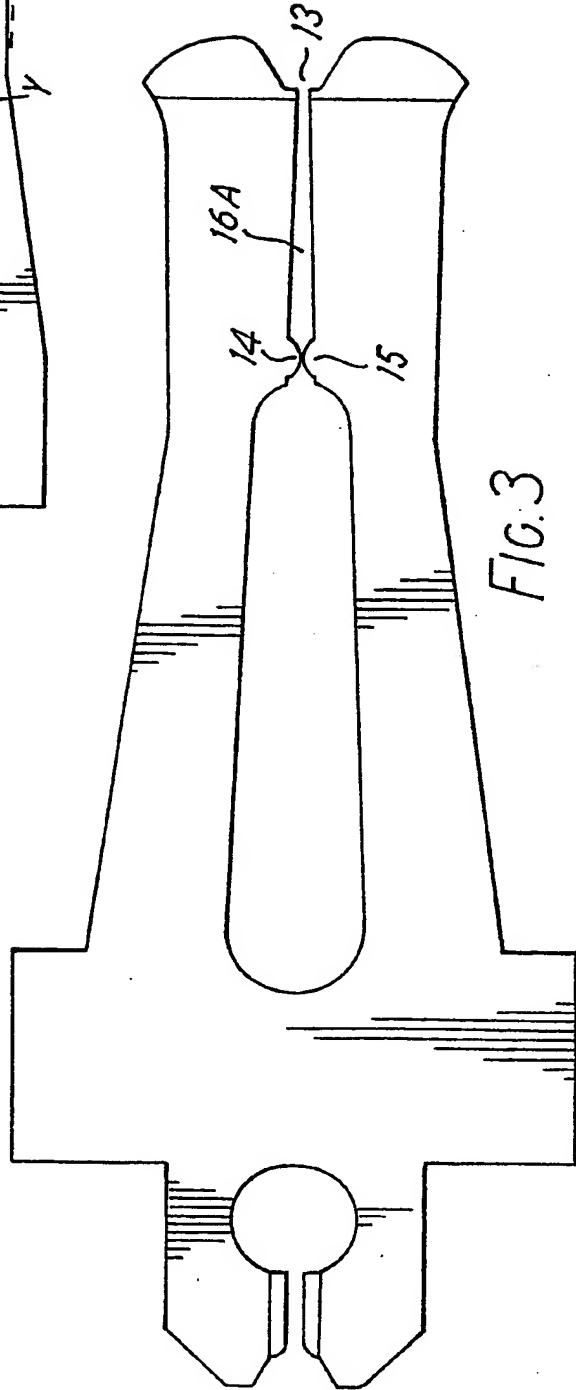
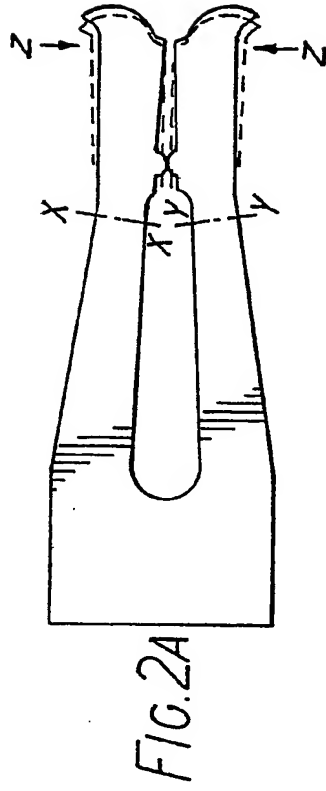
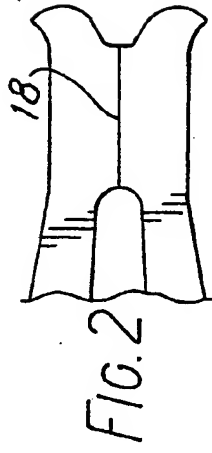
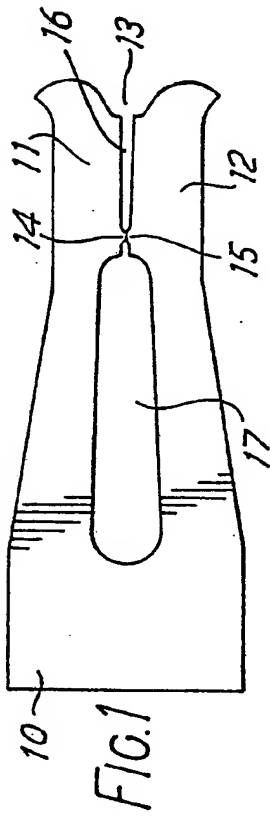
(54) Electrical contact or terminal

(57) A terminal 10 is bifurcated to provide a pair of resilient arms 11 and 12 terminating in a wire entry mouth 13. A slot 16a between the arms is widest at its end adjacent to the projections 14 and 15 and narrowest at its end adjacent to the entry mouth 13.



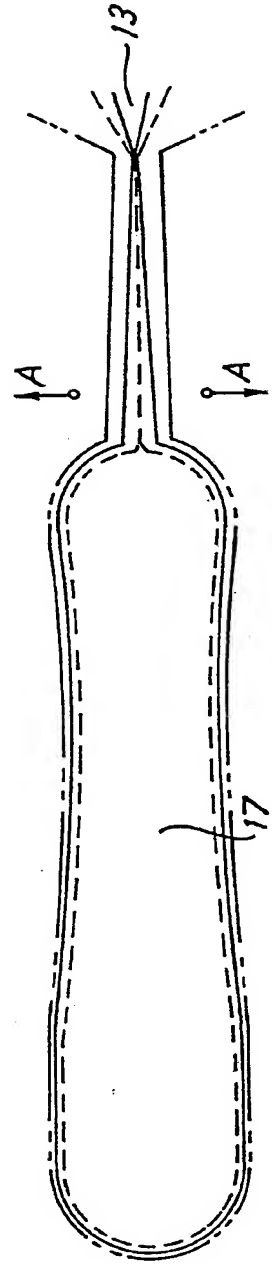
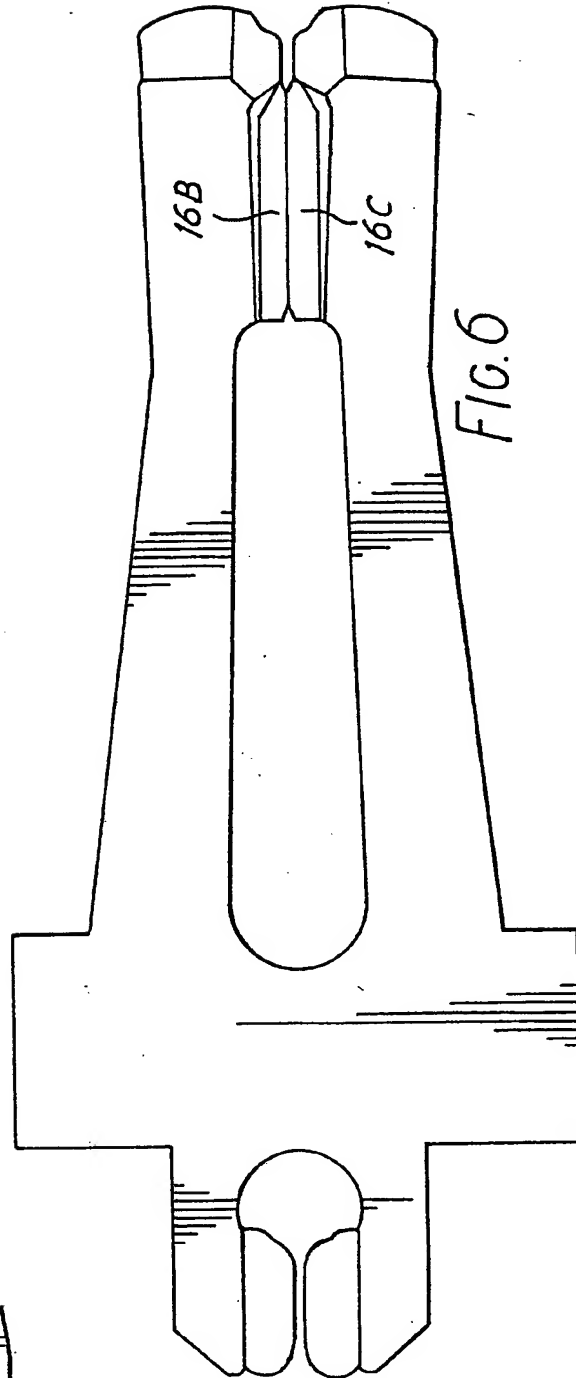
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SPECIFICATION

Electrical contact or terminal

5 A known form of electrical contact or terminal comprises a single bifurcated metal terminal, open at one end and closed at the other, and comprising a wire entry mouth followed by a tapered slot which progressively decreases in width towards a
10 restricted or closed end of the slot.

The terminal is made sufficiently resilient so that the bifurcated fingers or jaws can open sufficiently to receive a wire conductor, which may be insulated, the fingers or jaws resiliently closing onto
15 the wire so as to make good contact when the wire is in the slot.

It is an object of this invention to provide an improved electrical contact or terminal of this kind.

In accordance with the present invention there is
20 an electrical contact or terminal comprising a pair of resilient jaws or fingers forming a slot, or adapted to form a slot when the jaws or fingers are opened, adapted to receive and make contact with a wire, the slot having a restricted opening at
25 its open wire receiving end and a reverse taper extending along the slot from the restricted opening to the inner end of the slot, the slot being wider at its inner end than at the restricted opening.

The slot may be substantially closed at its inner
30 end by a pair of opposed projections, one on each of the jaws or fingers, and the reverse taper preferably extends from the restricted opening to said projections.

The angle of taper will be determined by the
35 general dimensions of the electrical contact but for many purposes an angle lying between 0.5° and 5° total included angle will be satisfactory. A preferred particular angle is $2\frac{1}{2}^\circ$ total included angle.

40 The invention may be applied to the type of known electrical contact or terminal in which an elongated aperture is formed in the terminal material some distance from the end of a sheared slot is then formed between the elongated aperture
45 and the end of the terminal and the terminal is then coined so as to pre-stress it and to form said tapered slot with, at its inner end, two projections which meet but are not joined.

In the accompanying drawings:

50 *Figure 1* is a plan view of an end portion of a known terminal and also represents an intermediate stage in the production of a terminal embodying the present invention;

Figure 2 is a scrap end portion of the terminal illustrating one stage in its production;

Figure 2a shows diagrammatically one way in which the reverse taper of a terminal embodying the present invention may be produced;

Figure 3 is an enlarged plan of a terminal embodying the present invention in its final form;

Figures 4 and 5 are respectively part of the plan of an end portion of a terminal embodying the present invention showing one stage in its production and a side elevation of the same terminal;

65 *Figure 6* is a plan of an alternative embodiment

of the invention showing a complete terminal embodying the present invention;

Figure 7 shows diagrammatically the form of the reverse taper slot in the embodiment of *Figure 6*.

70 The end portions of the terminal 10 shown in *Figure 1* has a pair of arms 11 and 12 terminating in an entry mouth 13. Between the mouth 13 and inwardly projecting portions 14 and 15 is a tapered slot 16. As can be seen from the drawing the slot
75 16 tapers away from the mouth 13 towards the inwardly projecting portions 14 and 15.

As is conventional resilience is provided by an aperture 17 in the body of the terminal.

In the formation of this type of terminal a sheared slit 18 is formed in the end portion of the terminal. This slit is formed by shearing the metal as shown in *Figure 2*, without removing any material leaving two flat opposed edges, which in theory, should touch along their length. The
85 subsequent coining operation which produces the projections 14 and 15 opens up this slit. The opened slit will naturally be wider at its open end and narrower towards the projections 14 and 15. Thus the natural result of these operations is to
90 produce the slit of the type shown in *Figure 1* which tapers away from the mouth 13 and towards the projections 14 and 15.

To produce the reverse taper in accordance with the present invention a further operation is necessary. One way of producing the reverse taper, of the kind shown at 16a in *Figure 3*, is illustrated in
95 *Figure 2a*. The end portions of the terminal are caused to yield across the sections XX, YY, by applying forces as indicated by the arrows ZZ.

100 It will be appreciated from *Figure 1* that the contact is designed to accept conductors approaching from the right. In use of these terminals it is conventional to use a plastic moulding or other tool to urge the conductors into the slot. Since the same
105 plastic moulding or other tool is used to urge all conductors into the slot a larger conductor is pushed further in than a small conductor.

In a typical use of a terminal of this kind, in the telecommunications industry, conductors range
110 from 0.5mm to 1.14mm in diameter, with diameters over insulation from 1.0 to 5.9mm. In the case of a normally tapered slot as shown in *Figure 1*, and assuming that the slot is at its widest end 0.3mm in diameter and at its narrow end 0.2mm in diameter, a 0.5 diameter conductor pushed just
115 into the open end opens the contact by 0.2mm. A 1.1 mm diameter conductor pushed into the narrow end of the slot opens the contact by 0.9mm (i.e. $1.1 - 0.2\text{mm}$). A contact which makes good electrical contact with a 0.5 mm wire may be
120 yielded (to take a permanent set) when the large wire is pushed in because it must accommodate a difference of 0.7mm in openings ($0.9 - 0.2$).

Considering now the reverse tapered slot shown in *Figure 3*, the width of the slot at its narrower end is 0.3mm in the particular example chosen and the width of the slot at its wider end is 0.5mm. The small conductor causes the gap to open by 0.2mm
125 ($0.5 - 0.3$) and the large conductor causes it to open by 0.6mm ($0.1 - 0.5$) giving a range of open-

ings of 0.4mm (0.6 - 0.2). Such a range of openings is less likely to cause setting of the contact than the 0.7mm difference with the prior art construction.

- 5 It might be argued that a disadvantage is that the larger conductor has to pass through the narrower part of the slot to get to its intended resting place. However this is not a valid argument because the contact is naturally more compliant at its tip. A maximum displacement is proportional to the square of the length, so a displacement of 0.8mm at the entrance to the slit is equivalent, in its tendency to yield the contact, to a displacement of a normal resting place of $(\frac{15}{18})^2 \times 0.8 = 0.56\text{mm}$.

It will be appreciated that these calculations refer to a contact of the dimensions indicated in Figure 3, the dimensions being shown in that Figure in millimetres.

- 20 An alternative form of contact embodying the present invention is illustrated in Figure 6 and is formed by the method illustrated in Figures 4 and 5.

The left hand end of this contact is conventional and does not use the reverse taper idea but the right hand end does involve the reverse taper although the reverse taper may not be apparent from Figure 6.

The edges 16b, 16c of the slot, when opened up exhibit the reverse taper. As shown in Figure 7 if the contact is pulled apart at the points A, it will be seen that the meeting surfaces 16b and 16c will, as shown in the dotted line, exhibit the reverse taper.

As the slit is allowed to relax again the outer edges of the slit (nearest the mouth) touch first and as the contact continues to relax the slit closes along its entire length bringing surfaces 16b and 16c together.

The contact is heavily preloaded and this preload causes the contact to deform so that the reverse slit apparently disappears. The way in which the contact is loaded, the reaction between opposing sides of the slits being entirely at the end by the mouth 13 achieves the desired result in accordance with the present invention.

The way in which this reverse taper is achieved is illustrated in Figures 4 and 5 and is an alternative to the way illustrated in Figure 2a.

Instead of bending the end of the contact at section XX, YY as shown in Figure 2a, the result is achieved by a long coining operation which, because it is deeper at the end 19 causes the contact to spread out more at this end.

In Figure 4 the dashed line shows the original outline before the coining and the hard line shows the final outline.

Figure 5 shows the thickness of the coined section.

A further probable advantage of the reverse taper, depending upon the sizes of cables and conductors employed is that the reverse taper would normally be able to accept two conductors simultaneously.

The electrical contact may be used for example in terminal blocks as used in the telecommunica-

tion industry, the power industry and the automotive industry. It may be used as a single terminal or one of a bank of terminals. The terminal shown in Figure 1 could be, as shown single ended or it could be a double ended terminal. Of course the reverse taper could be applied to both ends of the terminal if it were double ended.

CLAIMS

- 75 1. An electrical contact or terminal comprising a pair of resilient jaws or fingers forming a slot or adapted to form a slot when the jaws or fingers are opened, adapted to receive and make contact with a wire, the slot having a restricted opening at its open wire receiving end and a reverse taper extending along the slot from the restricted opening to the inner end of the slot, the slot being wider at its inner end than at the restricted opening.
- 80 2. An electrical contact or terminal according to claim 1 in which the slot is substantially closed at its inner end by a pair of opposed projections, one on each of the jaws or fingers.
- 85 3. An electrical contact or terminal according to claim 1 and in which the reverse taper extends from the restricted opening to said projections.
- 90 4. An electrical contact or terminal according to any of claims 1 to 3 and in which the angle of taper is determined by the general dimensions of the electrical contact but lies between 0.5° and 5° total included angle.
- 95 5. An electrical contact or terminal according to claim 4 in which said angle is 21/2° total included angle.
- 100 6. An electrical contact or terminal according to any preceding claim in which an elongated aperture is formed in the terminal material some distance from the end and a sheared slot is then formed between the elongated aperture and the end of the terminal and the terminal is then coined so as to pre-stress it and to form said tapered slot with, at its inner end, two projections which meet but are not joined.
- 105 7. A plurality of electrical contacts or terminals according to any preceding claim incorporated in a terminal block.
- 110 8. A telecommunications terminal or junction box incorporating a plurality of contacts or terminals according to any of claims 1 to 6.
- 115 9. An electrical contact or terminal substantially as hereinbefore particularly described and as illustrated in Figure 1 of the accompanying drawings.

Superseded claim 1

120 New or amended claim:

- 125 1. An electrical contact or terminal comprising a pair of resilient jaws or fingers forming a slot or adapted to form a slot when the jaws or fingers are opened, adapted to receive and make contact with a wire, the slot having a restricted opening at its open wire receiving end and a reverse taper extending along the slot from the restricted opening to the inner end of the slot, the slot being wider at its inner end than at the restricted opening, and
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having at least at its inner end, two projections
which meet but are not joined.

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